

What is claimed is:

1                   1.     In a gas generating device wherein a fuel material reacts to  
2     generate gas, the improvement comprising:  
3     a first chamber having contents including a quantity of a water-supplying compound  
4     and a quantity of a fuel precursor, the fuel precursor being water reactive; and  
5                   an initiator in discharge communication with at least a portion of the  
6     quantity of water-supplying compound content of said first chamber to form water,  
7     with at least a portion of the formed water reacting with at least a portion of the  
8     quantity of fuel precursor to form a quantity of the fuel material and resulting in  
9     opening of said first chamber with a release of at least a portion of the fuel material  
10    therefrom.

1                   2.     The gas generating device of claim 1 wherein the first chamber  
2     contents include at least a portion of the quantity of water-supplying compound and  
3     at least a portion of the quantity of the fuel precursor stored in direct contact.

1                   3.     The gas generating device of claim 2 wherein, in a static state, the  
2     first chamber is closed, the gas generating device additionally comprising:  
3                   a second chamber in fluid communication with said first chamber upon  
4     the opening of said first chamber, said second chamber containing a quantity of  
5     pressurized stored gas including a quantity of oxidant material, with at least a portion

6 of the fuel material released from said first chamber reacting with at least a portion of  
7 the oxidant material to form product gas, said second chamber adapted to open to emit  
8 at least a portion of the product gas therefrom.

1 4. The gas generating device of claim 1 wherein in an at rest  
2 condition, the quantity of water-supplying compound is stored segregated from the  
3 quantity of the fuel precursor within said first chamber.

1 5. The gas generating device of claim 4 wherein, in a static state, the  
2 first chamber is closed, the gas generating device additionally comprising:

3 a second chamber in fluid communication with said first chamber upon  
4 the opening of said first chamber, said second chamber containing a quantity of  
5 pressurized stored gas including a quantity of oxidant material, with at least a portion  
6 of the fuel material emitted from said first chamber reacting with at least a portion of  
7 the oxidant material to form product gas, said second chamber adapted to open to emit  
8 at least a portion of the product gas therefrom.

1 6. The gas generating device of claim 1 wherein the first chamber  
2 is defined at least in part by a perforated housing.

1                   7.     The gas generating device of claim 6 additionally comprising a  
2     second chamber in fluid communication with said first chamber, said second chamber  
3     containing a quantity of pressurized stored gas including a quantity of oxidant  
4     material, with at least a portion of the fuel material released from said first chamber  
5     reacting with at least a portion of the oxidant material to form product gas, said second  
6     chamber adapted to open to emit at least a portion of the product gas therefrom.

1                   8.     The gas generating device of claim 7 additionally comprising a  
2     liner within the first chamber perforated housing, the liner maintaining the first  
3     chamber contents in discharge communication proximity with the initiator device.

1                   9.     The gas generating device of claim 1 wherein the fuel precursor  
2     is at least one metal element-containing material selected from the group consisting  
3     of:

4                   hydrides, carbides, alkoxides and combinations thereof.

1                   10.    The gas generating device of claim 1 wherein the fuel precursor  
2     comprises a metal alkoxide.

1                   11.    The gas generating device of claim 10 wherein the fuel precursor  
2     comprises an alkali metal.

1 12. The gas generating device of claim 10 wherein the fuel precursor  
2 comprises an alkaline earth metal.

1 13. The gas generating device of claim 1 wherein the fuel precursor  
2 comprises at least one first component selected from the group of metals and  
3 organometallic compounds and at least one second component selected from the group  
4 of carbonates and bicarbonates.

1 14. The gas generating device of claim 1 wherein the fuel precursor  
2 comprises potassium t-butyl carbonate.

1 15. The gas generating device of claim 1 wherein the water-supplying  
2 compound comprises ammonium nitrate.

1 16. The gas generating device of claim 1 wherein the water-supplying  
2 compound comprises an inorganic compound with stabilized waters of hydration.

1 17. The gas generating device of claim 16 wherein the  
2 water-supplying compound comprises hydrated calcium oxalate.

1                   18.    An apparatus for inflating an inflatable device, said apparatus  
2    comprising:

3                   a closed first chamber having contents including a quantity of  
4    ammonium nitrate and a quantity of a fuel precursor, the fuel precursor being water  
5    reactive;

6                   an initiator in discharge communication with the contents of the first  
7    chamber for initiating decomposition of at least a portion of the quantity of ammonium  
8    nitrate to form water, with at least a portion of the formed water reacting with at least  
9    a portion of the quantity of fuel precursor to form a fuel material, said first chamber  
10   adapted to open when a predetermined increase in pressure within the first chamber  
11   is realized whereby at least a portion of the fuel material is emitted from said first  
12   chamber, and

13                  a second chamber containing a quantity of pressurized stored gas  
14   including a quantity of oxidant material, said second chamber in fluid communication  
15   with said first chamber upon the opening of said first chamber with at least a portion  
16   of the fuel material emitted from said first chamber reacting with at least a portion of  
17   the oxidant material to form inflation gas, said second chamber adapted to open when  
18   a predetermined increase in pressure within the second chamber is realized whereby  
19   at least a portion of the product gas is emitted from the second chamber to inflate the  
20   inflatable device.

1                    19.    The apparatus of claim 18 wherein the first chamber contents  
2 include at least a portion of the quantity of water-supplying compound and at least a  
3 portion of the quantity of the fuel precursor stored in direct contact.

1                    20.    The apparatus of claim 18 wherein in an at rest condition, the  
2 quantity of water-supplying compound is stored segregated from the quantity of the  
3 fuel precursor within said first chamber.

1                    21.    The apparatus of claim 18 wherein the fuel precursor is at least  
2 one metal element-containing material selected from the group consisting of:  
3                    hydrides, carbides, alkoxides and combinations thereof.

1                    22.    The apparatus of claim 18 wherein the fuel precursor comprises  
2 a metal alkoxide.

1                    23.    The apparatus of claim 18 wherein the fuel precursor comprises  
2 at least one first component selected from the group of metals and organometallic  
3 compounds and at least one second component selected from the group of carbonates  
4 and bicarbonates.

1                   24.    The apparatus of claim 18 wherein the fuel precursor comprises  
2   potassium t-butyl carbonate.

1                   25.    In a method for inflating an inflatable safety device via an inflator  
2   device wherein a fuel material reacts to form gas generation reaction products, the  
3   improvement comprising:

4                   heating a mixture containing at least a water-supplying compound and  
5   a water-reactive fuel precursor within the inflator device to form the fuel material in  
6   situ.

1                   26.    The method of claim 25 additionally comprising:  
2                   contacting the formed fuel material with a quantity of compressed gas,  
3   the compressed gas including a quantity of oxidant,  
4                   reacting at least a portion of the formed fuel material with at least a  
5   portion of the quantity of oxidant to produce heat,  
6                   heating a stored quantity of inert gas with at least a portion of the  
7   produced heat to form an increased volume of gas and  
8                   passing at least a portion of the increased volume of gas into the  
9   inflatable safety device to effect the inflation thereof.

1                   27.    The method of claim 25 wherein the fuel precursor is at least one  
2 metal element-containing material selected from the group consisting of:  
3                   hydrides, carbides, alkoxides and combinations thereof.

1                   28.    The method of claim 25 wherein the fuel precursor comprises a  
2 metal alkoxide.

1                   29.    The method of claim 25 wherein the fuel precursor comprises at  
2 least one first component selected from the group of metals and organometallic  
3 compounds and at least one second component selected from the group of carbonates  
4 and bicarbonates.

1                   30.    The method of claim 25 wherein the fuel precursor comprises  
2 potassium t-butyl carbonate.

1                   31.    The method of claim 25 wherein the water-supplying compound  
2 comprises ammonium nitrate.

1                   32.    In a vehicular inflatable safety assembly wherein a fuel material  
2 reacts to form gas generation reaction products, the improvement comprising:



3 the vehicular inflatable safety assembly containing a quantity of a  
4 water-supplying compound and a quantity of a water-reactive fuel precursor effective  
5 upon initiation to form the fuel material in situ.

1 33. The vehicular inflatable safety assembly of claim 32 wherein the  
2 fuel precursor is at least one metal element-containing material selected from the  
3 group consisting of:

4 hydrides, carbides, alkoxides and combinations thereof.

1 34. The vehicular inflatable safety assembly of claim 32 wherein the  
2 fuel precursor comprises a metal alkoxide.

1 35. The vehicular inflatable safety assembly of claim 32 wherein the  
2 fuel precursor comprises potassium t-butyl carbonate.